

Nutritional Intake and Bone Mineral Density in Boys with Severe Hemophilia

C Bos, AKC Chan, SA Atkinson, K Badosz, T Almonte, K Decker, R Goldsmith, A Iorio, K Nagel, K Strike, C Webber, I Walker, K Webert.

Introduction:

Individuals with hemophilia may have lower bone mineral density (BMD) than their healthy peers.¹ Whether sub-optimal intake of nutrients essential for bone health is a causative factor remains unknown. The aim was to estimate average daily intakes of calcium (Ca), vitamin D (D), vitamin K (K), and protein in children and youth with severe hemophilia A or B to examine the relationship between nutrition and BMD.

Methods:

Methods: In this cross-sectional, observational study at McMaster Children's Hospital, Hamilton, nutrient intakes of males ages 4-18 years were estimated from a Food Frequency Questionnaire and compared to the recommended Estimated Average Requirement (EAR) or Adequate Intake (AI)² and population-based intakes of healthy Canadian children.³ Whole body BMD was measured by dual energy x-ray absorptiometry and expressed as Z-score for age using reference data from Canadian children.⁴

Results:

16 subjects with severe hemophilia A or B were recruited (13 FVIII, 3 FIX), age (mean (SD)) was 9.6 (4.6). Mean whole body BMD Z-score for ages 4-8 years was -1.28 (0.59), and for ages 14-18 years was -0.67 (1.24). Mean whole body BMD Z-score for all subjects was -1.12 (0.93), significantly lower than 0 (p<0.001).

Nutrient	Ages 4-8 yr		Ages 14-18 yr	
	Without Supplements	With Supplements	Without Supplements	With Supplements
Calcium (mg/d)	1476 (160)	1513 (156)	736 (154)	-
EAR Calcium	800 mg		1100 mg	
Vitamin D (IU/d)	383 (40)	475 (65)	153 (39)	-
EAR Vitamin D	400 IU			
Vitamin K (µg/d)	103 (11)	-	110 (38)	-
AI Vitamin K	55 µg		75 µg	
Protein (g/d)	95 (11)	-	67 (11)	-
EAR Protein	19 g		44 g	
Protein (g/kg/d)	4.0 (0.32)	-	1.0 (0.19)	-
DRI Protein	0.76 g/kg		0.73 g/kg	

Table 1: Mean daily nutrient intakes by age compared to Estimated Average Requirement or Adequate Intake.

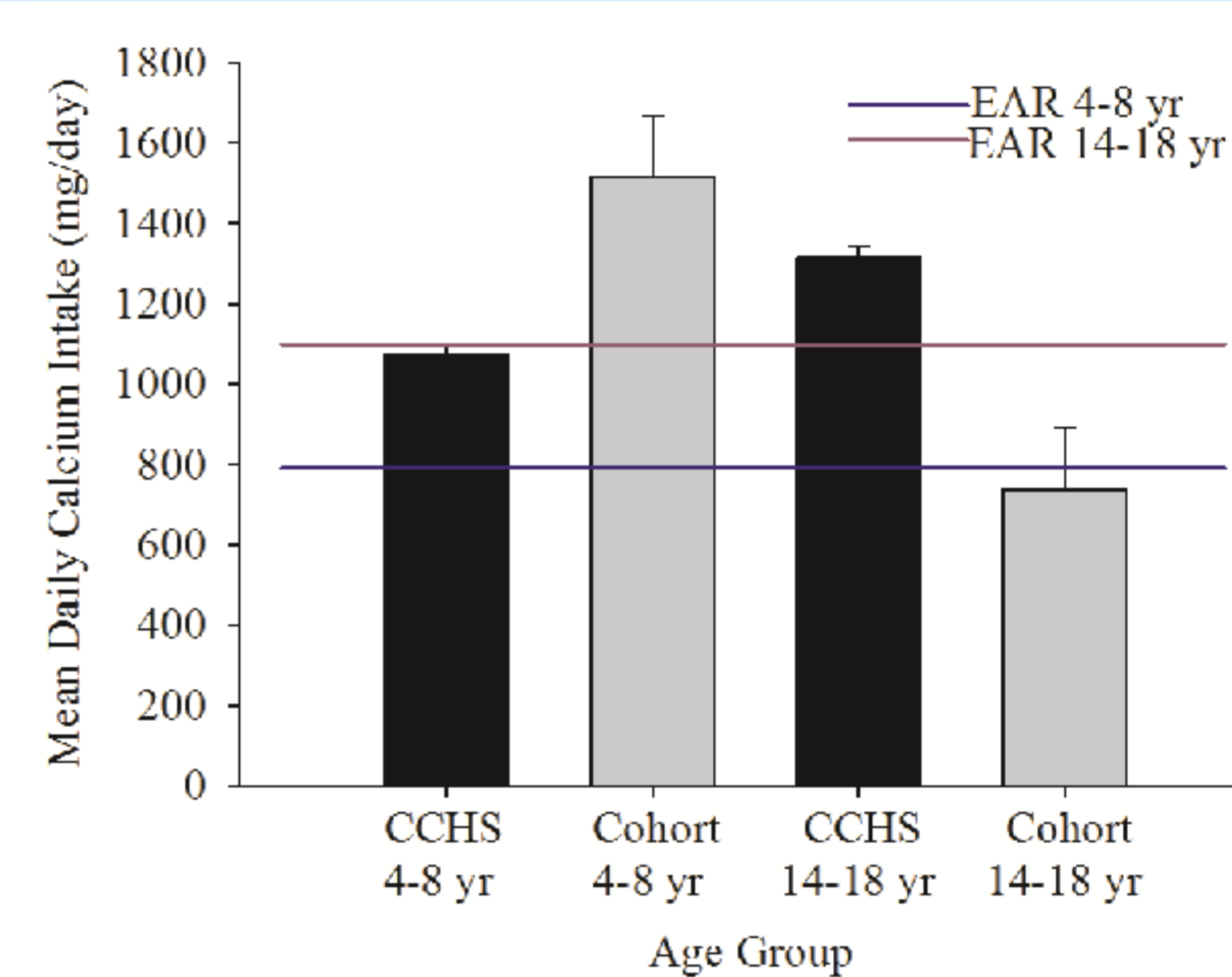


Figure 1: Mean daily calcium intake in mg/day for 4-8 & 14-18 yr age groups. CCHS – Canadian Community Health Survey reference values for normal healthy Canadian children, Nutrient Intakes 2.2, 2007². EAR – Estimated Average Requirement from the Dietary Reference Intakes (IOM, 2010)³.

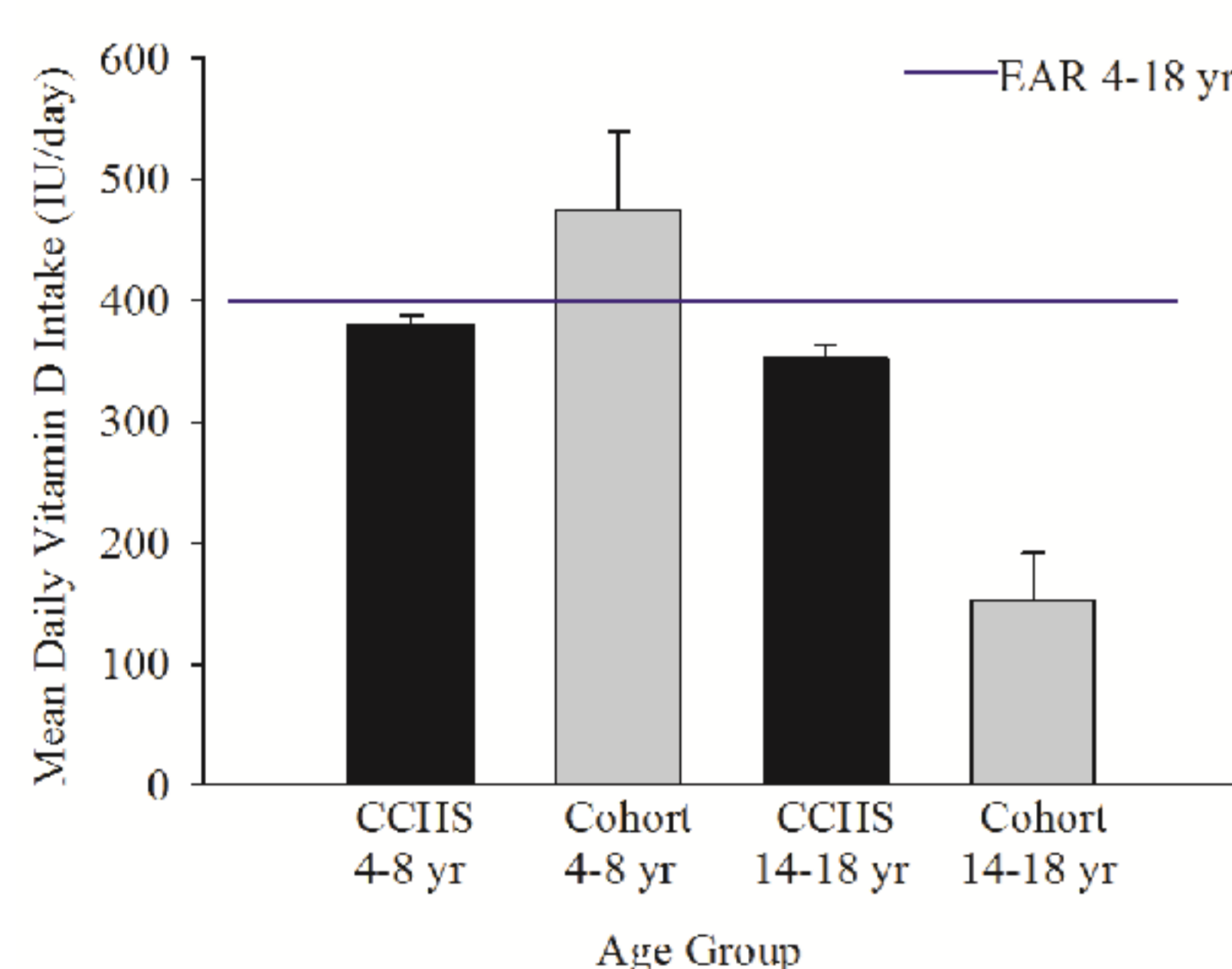


Figure 2: Mean daily vitamin D intake in IU/day 4-8 yr & 14-18 yr age groups. EAR (IOM, 2010)³. (1µg = 40 IU).

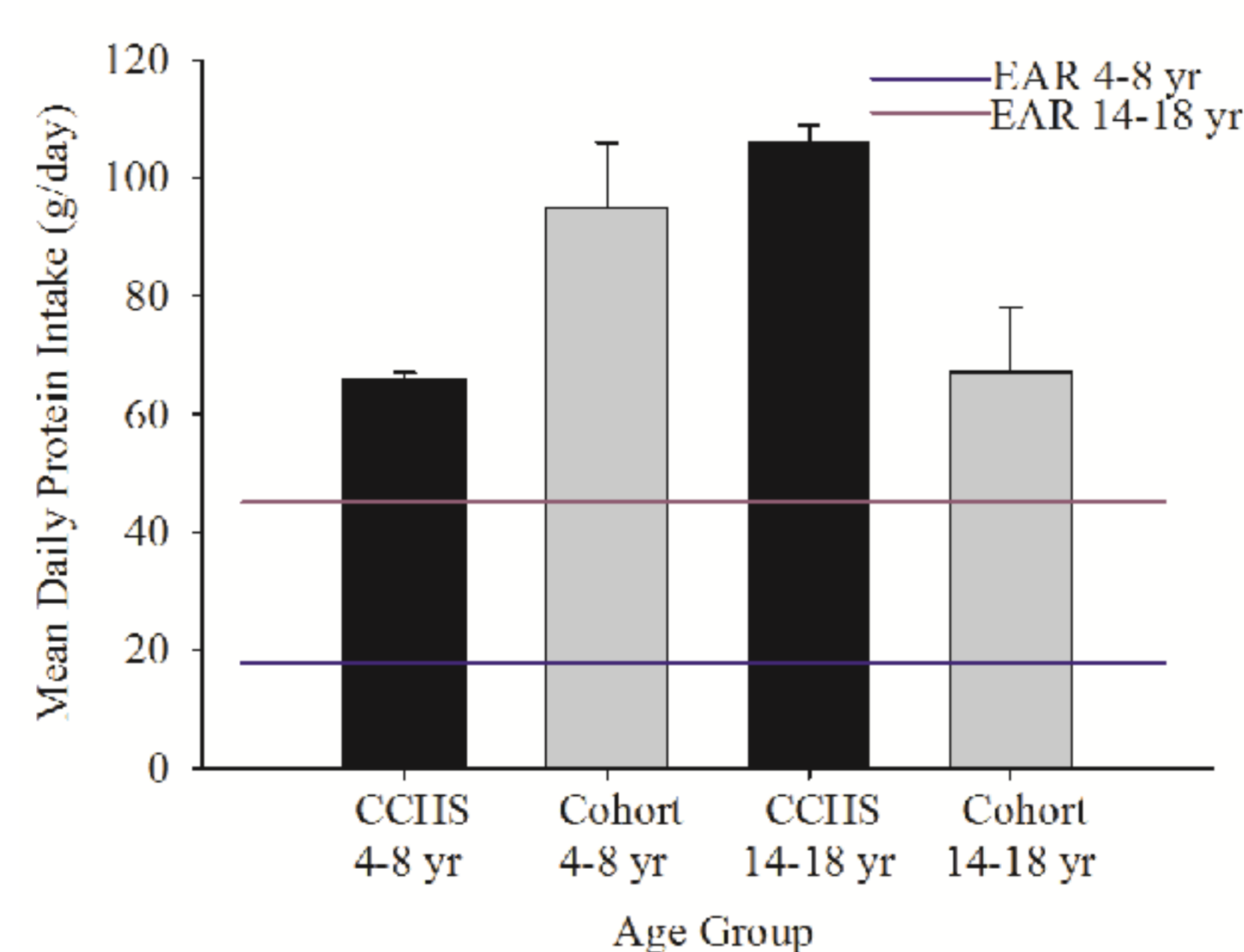


Figure 3: Mean daily protein intake in g/day for 4-8 & 14-18 yr age groups. EAR (IOM, 2005)³.

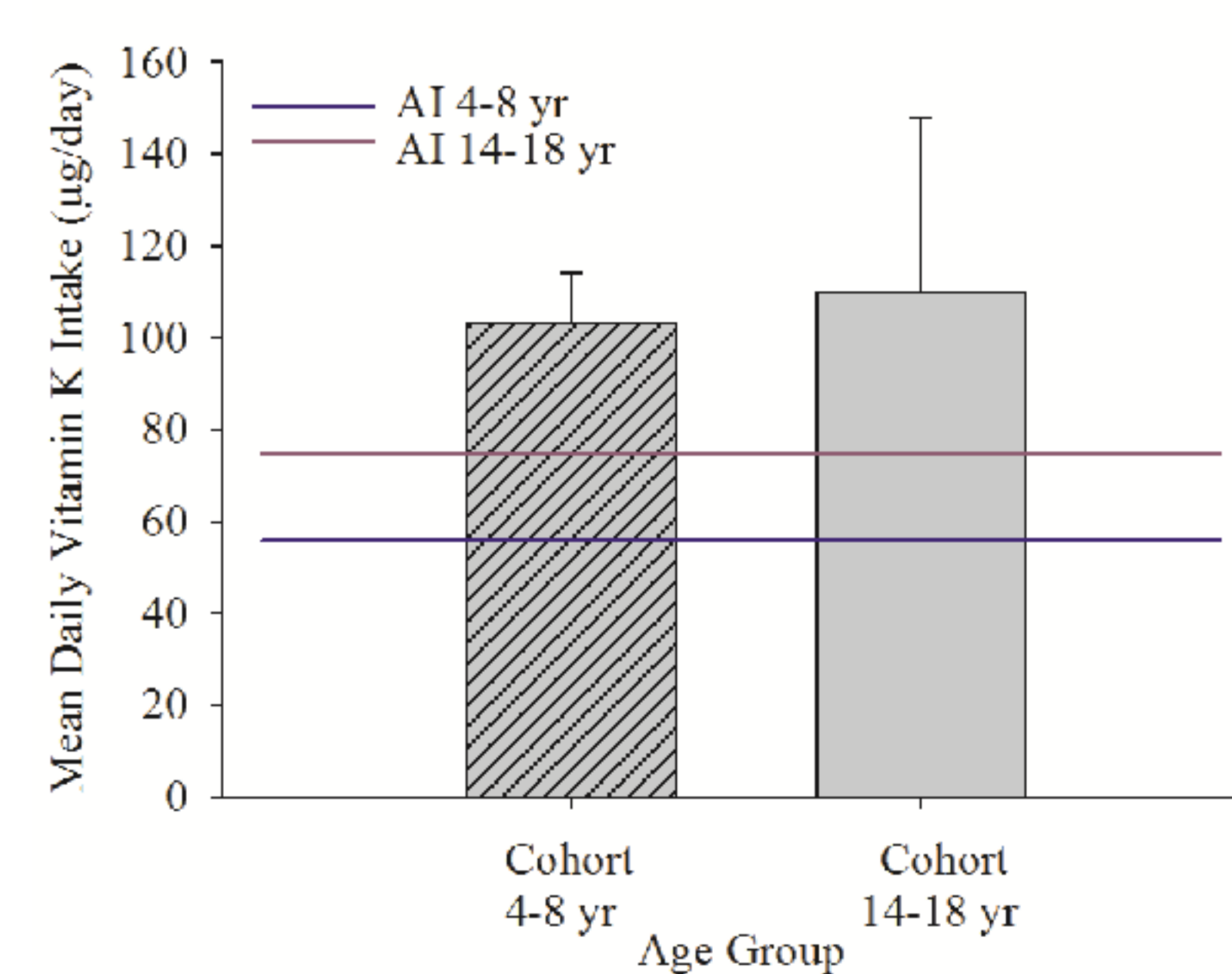


Figure 4: Mean daily vitamin K intake in µg/day for 4-8 yr & 14-18 yr age groups. AI – Adequate Intake from the Dietary Reference Intakes (IOM, 2001)³.

Conclusions:

Intakes of calcium and vitamin D fell below the EAR and were lower than population-based data only in the adolescent group. BMD Z-score was significantly lower than reference values. The relationship between nutrient status and BMD will be explored with a larger sample group and after adjusting for confounders of physical activity, drug therapy, and joint health.

References:

- Iorio, A. et al. (2010) Thrombosis and Haemostasis. 103 (3), 596-603
- Institute of Medicine. (2001, 2005, 2010). Dietary Reference Intakes. Retrieved from: <http://www.iom.edu/>
- Canadian Community Health Survey Cycle 2.2 (2004). Retrieved from: <http://hc-sc.gc.ca/fncan/surveill/nutrition/commun/art-nutr-eng.php>
- Sala A, Webber CE, et al. (2007) Can Assoc Radiol J. 58(1):46-5

Acknowledgment:

Support received from the Canadian Hemophilia Society Care Until Cure Award, 2011

